METHOD AND SYSTEM FOR MULTICHANNEL-ISOLATION-TECHNIQUE MULTIPLEXER

FIELD OF THE INVENTION

The present invention relates generally to multiplexers and more particularly to a method and system for reducing cross-talk and jitter in such multiplexers.

BACKGROUND OF THE INVENTION

In conventional multiplexers the output voltage of the active output is influenced by the non-active input if both inputs have similar phase conditions. The reason for this behavior is the coupling capacitance Ccb of the non-active input to the active output. This results in a non-optimal isolation of the active and the non-active channel with higher crosstalk and higher jitter.

Figure 1 is a diagram of a conventional multiplexer 10. The conventional multiplexer includes first and second differential amplifiers 12 and 14. As is seen, differential amplifier 12 comprises transistors 16a and 16b, and differential amplifier 14 comprises transistors 18a and 18b. The conventional multiplexer 10 has its non-inverted Select input set to high and its inverted Select input set to low. The active channel is input IN1 with the transistors 16a, 16b, 20a and 20b. Accordingly, there is a high coupling capacitance between the non-active input IN2 and the active output. Therefore it is desirable to provide better isolation between active and inactive channels and thereby reduce crosstalk and jitter.

Accordingly, what is needed is a system and method for overcoming the above-identified problem. The present invention addresses such a need.

SUMMARY OF THE INVENTION

A multiplexer is disclosed. The multliplexer comprises a first input and a first channel coupled to the first input. The multiplexer further includes a second input and a second channel coupled to the second input. Finally, the multiplexer includes an output coupled to the first and second channels, wherein a coupling capacitance of an inactive one of the first and second channels is not coupled directly to the output.

A method and system in accordance with the present invention reduces crosstalk and jitter in a multiplexer by eliminating the coupling capacitance between an inactive input and the output. In so doing, there is significantly better isolation between channels thereby minimizing the aforementioned cross-talk and jitter.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagram of a conventional multiplexer.

Figure 2 is a diagram of a multiplexer in accordance with the present invention.

DETAILED DESCRIPTION

The present invention relates generally to multiplexers and more particularly to a method and system for reducing cross-talk and jitter in such multiplexers. The following description is presented to enable one of ordinary skill in the art to make and use the invention and is provided in the context of a patent application and its requirements. Various modifications to the preferred embodiment and the generic principles and features described herein will be readily apparent to those skilled in the art. Thus, the present invention is not intended to be limited to the embodiment shown but is to be accorded the widest scope

consistent with the principles and features described herein.

A method and system in accordance with the present invention reduces crosstalk and jitter in a multiplexer by eliminating the coupling capacitance between an inactive input and the output. In so doing, there is significantly better isolation between channels thereby minimizing the aforementioned cross-talk and jitter.

In a preferred embodiment, the coupling capacitance is moved one level down from the output level. Hence, there is no direct coupling between an active input and a non-active input to the output. This modification in the present multiplexer reduces the crosstalk and jitter significantly. To describe these features in more detail, please refer now to the following description in conjunction with the accompanying figure.

Figure 2 is a diagram of a multiplexer 100 in accordance with the present invention. Please find below a glossary of terms related to Figure 2.

Glossary of Terms

S	non-inverted Select input
Sb	invertedSelect input
IN1	non-inverted Data input 1
IN1b	inverted Data input 1
IN2	non-inverted Data input 2
IN2b	inverted Data input 2
Q	non-inverted Output
Qb	inverted Output
Ccb	Collector base capacitance
tph	Phase relation between input 1 and input 2

Operation

It is assumed the active input is IN1 with the corresponding differential amplifier 101 which comprises transistors 102 and 104. The collectors of transistors 102 and 104 are coupled to differential amplifier 103, which comprises transistors 106 and 108, and a differential amplifier 105, which comprises transistors 110 and 112.

The non-active input IN2 is coupled to differential amplifier 107, which comprises transistors 114 and 116. The collectors of transistors 114 and 116 are coupled to differential amplifier 109, comprising transistors 118 and 120, and differential amplifier 111, which comprises transistor 122 and 124. The collectors of transistors 108, 110, 120 and 122 are coupled to VCC. The collectors of transistors 106 and 118 are coupled together to resistor 126 and form the inverted output Qb. The collectors of transistors 112 and 124 are coupled together to resistor 128 and form the non-inverted output Q.

Consider now the case when the non-inverted Select input is high and the inverted Select input is low. Therefore, transistors 106, 112, 120 and 122 are on and transistors 108, 110, 118 and 124 are off. The input IN1 is passed to the output since IN2 has no impact because the collectors of transistors 120 and 122 are coupled to VCC.

Consider the case when the inverted Select input is high and the non-inverted Select input is low. Therefore, transistors 108, 110, 118 and 124 are on and 106, 112, 120 and122 are off. The input IN2 is passed to the output since IN1 has no impact because the collectors of transistors 108 and 110 are coupled to VCC. It is assumed that there is a constant low impedance DC level of the inverted and non-inverted Select input. Accordingly, there is a minimum impact of the non-active channel on the active channel since the coupling capacitance of the non-active channel is not coupled directly to the output.

A method and system in accordance with the present invention reduces crosstalk and jitter in a multiplexer by eliminating the coupling capacitance between an inactive input and the output. In so doing, there is significantly better isolation between channels thereby minimizing the aforementioned cross-talk and jitter.

Although the present invention has been described in accordance with the embodiments shown, one of ordinary skill in the art will readily recognize that there could be variations to the embodiments and those variations would be within the spirit and scope of the present invention. Accordingly, many modifications may be made by one of ordinary skill in the art without departing from the spirit and scope of the appended claims.